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The scientific design of five projects has been approved and three of these are underway. A clinical research laboratory has recently become operational and is receiving samples from U.S. Army Research Institute of Environmental Medicine. The Fort Polk Heart Smart Project is in the start-up phase with an assessment of nutritional and exercise habits of military wives as well as a screening assessment for a cardiovascular disease in military dependents. A Diet, Neurotransmitters, and Behavior project examines cyclo (His-Pro) neurochemistry and tryptophane metabolite neurochemistry. The Stable Isotope Laboratory Project will begin in September, 1989 and the Menu Modification Project will begin in January, 1990.

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FOREWORD

Opinions, interpretations, conclusions and recommendations are those of the author and are not necessarily endorsed by the U.S. Army. CHK

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For the protection of human subjects, the investigator(s) have adhered to policies of applicable Federal Law 45CFR46. DHK

In conducting research utilizing recombinant DNA technology, the investigator(s) adhered to current guidelines promulgated by the National Institutes of Health.

PI Signature: Donna Ryan Date: 9/1/99

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INTRODUCTION

In July, 1988, Grant #DAMD17-88-Z-8023 was awarded to Pennington Biomedical Research Center (PBRC) for $3,500,000 for a three-year period to fulfill the following research objectives:

1) "Establish a Nutritional Health Promotion Research Development Test and Evaluation (RDTE) Center for military personnel and dependents in a peacetime environment to accomplish the following:

   a. Assess the nutritional adequacy of the diet of military personnel to promote health and military readiness;

   b. evaluate and develop military dietary programs for dining facilities, commissaries and other food service facilities operated by the military;

   c. monitor the nutritional status of military personnel and their family members; and

   d. develop and evaluate military nutrition, education, and health promotion programs.

2) Provide nutrition laboratory research support to the army's military nutrition research program at USARIEM to accomplish the following:

   a. provide biochemical assessment of nutrition status;

   b. perform food biochemistry analysis; and

   c. establish and perform stable isotope methodologies for nutritional assessment."

Meetings between representatives of LSU Medical Center and Pennington Biomedical Research Center and the US Army were held in August, 1988, to identify research to fulfill the above objectives. Representing the US Army were Col. David S. Schnakenberg, Lt. Col. Eldon Askew, Col. Dale Block, M.D., and Major Judy Turcotte. The Committee on Military Nutrition of the National Academy of Science came to Baton Rouge in December, 1988, to review research proposals from PBRC scientists. At Pennington Biomedical Research Center, three individuals worked to coordinate the scientific efforts. They were William Pryor, Ph.D., Acting Director PBRC, George Bray, M D., Director PBRC, and Donna Ryan, M.D. Principal Investigator, US Army Grant.

Five projects whose scientific design has been approved by the United States Army are listed below.

1) Cardiovascular Health Promotion for Military Personnel and their Dependents-the Fort Polk Heart Smart Project-Principal Investigators, Gerald S. Berenson, M.D., and David Harsha, Ph.D.,
2) "Diet, Neurotransmitters and Behavior", Chandan Prasad, Ph.D., Principal Investigator,
3) Clinical Research Laboratory, Richard Tulley, Ph.D., Laboratory Manager,
4) Stable Isotope Laboratory, James DeLany, Ph.D., Laboratory Manager,
5) U S Army Menu Modification Project, Nena Cross, Ph.D., Principal Investigator.

These five projects were developed after proposal to the U S Army personnel representing USARIEM and after review by the Army's Committee on Military Nutrition. Investigators for the "Fort Polk Heart Smart Study", the "Diet, Neurotransmitters and Behavior" and the "U S Army Menu Modification

Project" also traveled to Natick Massachusetts to collaborate with USARIEM personnel and to finalize study design. In addition, investigators for the "Fort Polk Heart Smart Project" collaborated with Col. Garland McCarty and Col. Fred Cecere at Fort Polk, Louisiana.

DISCUSSION OF GRANT PROJECTS

1. Cardiovascular Health Promotion for Military Personnel and their Dependents-the Fort Polk Heart Smart Project", Gerald Berenson, M.D. and David Harsha, Ph.D.

INTRODUCTION

The U.S. Army funded a team of epidemiological investigators under Dr. Gerald Berenson of the L.S.U. Medical Center to conduct research on the health, nutritional and activity status of military personnel and their dependents. This series of programs is underway at Fort Polk, Louisiana and is titled the "Fort Polk Heart Smart Project."

Three sub-studies have been approved by the Army. These are:

1) Baseline Assessment of Dietary Intake and Physical Activity in Military Dependents;

2) Cardiovascular Risk Assessment of Families on Arrival at Fort Polk; and

3) Family Health Promotion.

Efforts to date are focused on projects 1 and 2.

BACKGROUND

Over the past two decades, significant studies have been conducted exploring the early natural history of coronary artery disease. Multidisciplinary epidemiologic studies conducted at LSU through the National Research and Demonstration Center-Arteriosclerosis and the Specialized Center of Research-Arteriosclerosis have provided both epidemiologic and experimental observations that clearly indicate the evolution of coronary artery disease beginning in youth. The major ongoing program is the Bogalusa Heart Study, an epidemiologic investigation of cardiovascular risk

factors in a total pediatric population of approximately 5,000 children. The study has several advantages over previous adult programs, such as Framingham, Evans County and others. It observes changes over time, racial (black-white) contrasts, gender differences, and changes that occur with growth phases of infancy, childhood, adolescence, and young adulthood. These findings apply directly to Army personnel and their health maintenance in peace and under crisis situations. Extensive demographic, anthropometric, blood pressure, serum lipid and lipoprotein, nutritional, lifestyle, and behavioral data have been collected and are applicable to young adults. These studies have served in the past to stimulate observation by others and currently to call attention in clinical practice to the need for identifying cardiovascular risk factors measured at an early age as a basis for prevention of cardiovascular disease later in life. Identification of Army personnel with high cardiovascular risk has major implications for performance and for future efficiency and cost effectiveness for health related problems.

A recent study was conducted on serum lipid and lipoproteins on approximately 90 young Army personnel at Fort Jackson, South Carolina. The distributions were similar to those that are found in the Post High School Study of the Bogalusa Heart Study. As expected, some had high levels of serum total cholesterol and low density lipoprotein cholesterol (LDL-C) and some with relatively low high density lipoprotein cholesterol (HDL-C). These can obviously be evaluated as having cardiovascular risk. The other data show low values which may be misinterpreted as an indication of "health". However, it might be pointed out that there is an unusual decrease of serum total cholesterol, LDL-C and HDL-C at puberty with a slow rise in adulthood. The rise of LDL-C in black males is slower than whites. The data of Fort Jackson reflect on this dip in serum total cholesterol and should not be

misleading. The corrollary autopsy data on soldiers in Korea, Viet Nam and now Bogalusa show coronary artery disease is developing despite concomitant low levels. In part, such changes may reflect smoking or other adverse lifestyles, but these observations are important to note and consider in continuing research on heart disease.

General Progress

The early summer months of 1989 saw the final stages of development of a field staff, equipment acquisition, and investigator training. By the beginning of July, three part-time phlebotomists were added to the existing personnel at Fort Polk; 1 project coordinator and 2 nutritionists. These new employees will conduct venipuncture and blood pressure determinations and other measurements during cardiovascular disease (CVD) risk factor screenings as well as assist in editing and questionnaire administration during nutritional surveys. All three attended 2 CVD risk factor training sessions in Bogalusa, Louisiana conducted by Bogalusa Heart Study personnel in July and August of 1989.

All Fort Polk staff have received training at the Army post in anthropometric, blood sample handling, computer data management, and research administrative procedures on 3 occasions in June, July, and August. These sessions were conducted by staff from the L.S.U. Medical Center in New Orleans. All Fort Polk staff were involved in the identification, contact, and acquisition of consent from potential subjects for projects 1 and 2 during June, July, and August of 1989.

Human subjects review approval was obtained from the L.S.U. Medical Center in May of 1989. Materials were then submitted to the analogous review board of the Army Surgeon General's office which approved the research in August, 1989.

Progress - Project 1

Project 1 consists of 2 separate evaluations of female spouses of military personnel. One is a battery of questionnaires designed to obtain information concerning family diet, food preference, food purchasing, physical activity, and other health-related behavior patterns. The second is a CVD risk factor screening for blood lipids, blood pressure, and body composition levels. These two sessions will occur approximately 2 weeks apart for each subject.

Pilot sessions for the nutrition/physical activity evaluations took place on June 22, 1989 on a sample of 7 military wives. Review of results indicated no significant problems in questionnaire administration. Preliminary results are presented in the appendix. Data collection for this portion of Project 1 began on August 14, 1989, and continued through August 23. A sample of 86 subjects underwent evaluation during that period. Their data are currently being edited and keypunched.

The CVD risk factor component of Project 1 will begin on September 6, 1989. At this time all 86 of the previously seen subjects will be scheduled for blood lipid, blood pressure, and anthropometric determinations. A pilot for the CVD risk screening was held on August 28, 1989 on 6 subjects at Fort Polk, preliminary to data collection for the study.

Progress - Project 2

Project 2 is a CVD risk factor screening of families of military personnel newly arrived at Fort Polk. Criteria for inclusion in this sub-study specify intact families having resided on the post for 3 months or less. It is anticipated the study will begin during October, 1989. For this reason, families arriving in July, 1989 or later will be included. Permission from the Army to use their central personnel computer data base was obtained in July of 1989. This permits identification of and contact with eligible families within

4-5 weeks of arrival. Initial efforts in this regard have yielded approximately 40 consenting families to date. This roster will be updated monthly until 200-300 families have been examined. Screening is identical to that in Project 1 and so requires no separate pilot work or development of procedures.

These two projects are a prelude to beginning Project 3 of Health Promotion for families of military personnel. In order to develop a model of health promotion it will be useful to understand nutrition and lifestyles of dependents and risk factor information on the family members and military personnel. Practical approaches to behavioral and risk factor alterations will be undertaken.

2. **"Diet, Neurotransmitters and Behavior - Chandan Prasad, Ph.D.**

INTRODUCTION

This USARIEM-PBRC collaborative research program was initiated on June 1, 1989 at the Laboratory of Nutritional Neurobiology, PBRC. To expedite progress on this program, Dr. Prasad initiated several related studies in the New Orleans laboratory at LSU Medical Center.

BACKGROUND

The Pennington Biomedical Research Center, a newly-opened research facility affiliated with Louisiana State University Medical Center (LSUMC), is establishing a research Laboratory of Nutritional Neurobiology with emphasis in the area of nutrition. It is expected that the Laboratory of Neurosciences can draw heavily from existing resources in the basic neurosciences at the LSUMC, as well as recruit new scientists.

The USARIEM Health and Performance Division has two on-going, in-house, research programs in nutrition and behavior. The first entitled "Neurochemistry and Behavior" is an animal program focused on elucidating the relationship of brain neurotransmitter systems and cognitive (spatial) information processing. Central neurotransmitter systems are manipulated by investigating the separate and combined effects of nutrient precursors of neurotransmitters (e.g., choline), pharmacologic agents (anticholinergics, anit-AChE) and environmental stress (e.g. heat, cold, hypoxia) on changes in brain neurochemistry and behavior. The second entitled "Nutritional and Pharmacologic Stragegies to Enhance Performance" is a human program to provide quantitative human data on the efficacy of nutritional and/or pharmacologic strategies to enhance human performance and attenuate well-documented decrements in military skills resulting from exposure to

environmental stress (heat, cold, hypoxia) and operational factors (sustained operations, exercise, sensory demands).

The most productive collaborative arrangement should focus on combining the relative strengths of the USARIEM Health and Performance Division and the LSU Laboratory of Neuroscience at Pennington. LSU could concentrate on elucidating basic neuroscience mechanisms of dietary neurotransmitter precursors on brain function and developing their clinical application. USARIEM Health and Performance Division will continue to characterize the relationship of brain neurotransmitter systems on several behaviors (information processing, motor, exploratory). As such, USARIEM can perform, or advise, behavioral assessments on candidate substances mutually agreed upon.

PBRC/USARIEM collaboration will focus on the following areas of animal research:

1) Behavioral neurochemistry of food-derived peptides. Three peptides will be included in this study i) cycle (His-Pro), ii) casein-derived peptides (exorphins), and iii) delta-sleep inducing peptide, DSIP.

2) Effect of major dietary components (carbohydrate and proteins) on neurochemical make-up of the brain including, transport of neurotransmitter precursors and neurotransmitter synthesis.

3) Formation of secondary tryptophan metabolites from dietary tryptophan, and the role of these metabolites in neuronal function.

General Progress

A nutritional neurobiology lab is equipped and three Ph.D. level scientists have been recruited to begin the program.

Progress on Behavioral Neurochemistry of Cyclo(His-Pro).

1) Cyclo (His-Pro) modulation of dopamine transporter complex.

Cyclo (His-Pro) (CHP) is a cyclic dipeptide that is ubiquitously distributed throughout the central nervous system, including the striatum. Although CHP was initially discovered as a metabolite of thyrotropin-releasing hormone, recent studies have shown that CHP may be derived from sources other than TRH, including food. Many biologic effects of CHP seem to be mediated through a dopaminergic mechanism. To further examine the mechanism of action of this peptide, Dr. Prasad studied the effects of chronic CHP treatment on the properties of nigro-striatal dopaminergic neurons in rats. Chronic CHP administration elicited significant increases in both K_D and Bmax of striatal mazindol-binding sites (labelling dopamine (DA) transporter complex), but no change in either D_1- or D_2-type DA receptors. Chronic treatment with DA uptake blockers (e.g., benztropine, GBR 12909, bupropion, and mazindol) also produced changes in striatal mazindol-binding sites that were similar to that of chronic CHP. Furthermore, CHP led to a dose-dependent inhibition of [^{3}H]-DA uptake by striatal synaptosomes, reaching maximal inhibition of uptake (30%) at CHP dosage of 10nM. The dose-response curve for CHP inhibition of DA-uptake, unlike DA-uptake blockers that led to a total inhibition, was partial and V-shaped. Again unlike DA uptake blockers, CHP did not inhibit the binding of [^{3}H]-mazindol to striatal membranes. On the basis of these data we hypothesize that while CHP may inhibit DA-uptake by modifying mazindol-binding locus of the DA-transporter complex, its primary action may be at a site other than the mazindol-binding site.

2) CHP in human and rat urine.

Dr. Prasad has attempted to validate the presence of CHP like immunoreactivity in human urine. The long-term goal of this study is to

examine the biologic role of this peptide *in man* by examining its level in urine, an easily collected biological fluid, under different pathophysiologic conditions.

Measurements of CHP levels in human urine were carried out by specific RIA. CHP-like immunoreactivity (CHP-LI) in urine was found to be immunologically, pharmacologically, and physico-chemically (by chromatographic, GC/MS, and NMR analyses) identical to that of synthetic CHP. The concentration of urinary CHP in 24-h collection was 1133.8 $\pm$ 122.5 nmol/L, with a range of 606 to 1865 nmol/L. The daily excretion rate of CHP was 1812 $\pm$ 248 n mol/g creatinine. Although CHP was initially discovered as a metabolite of thyrotropin-releasing hormone, many other sources--including dietary protein--have been suggested. Dr. Prasad has examined, therefore, whether consumption of a diet rich in protein can lead to increased urinary excretion of CHP. To this end, six rats were kept on an equicaloric, all carbohydrate-fat diet for 5 days and then switched to an all protein (casein)-fat diet for another 5 days. Twenty four hr urine samples were collected on days 4 and 5 of each diet, and samples were analyzed for CHP-LI and creatinine. Results show that there was a 68% increase in the urinary level of CHP-LI when animals were switched from carbohydrate to protein diet. In conclusion, these data suggest that at least part of urinary CHP may be derived from dietary protein.

Diet	CHP-LI, ug/dl	Creatinine, mg/dl
Carbohydrate	5.8 $\pm$ 1.7	14.2 $\pm$ 0.5
Protein	9.9 $\pm$ 1.9	15.8 $\pm$ 0.9
p-value	0.004	0.06

Table 1 Cyclo(His-Pro) measurements in urine following consumption of high carbohydrate or high protein diets.

Progress on formation of secondary tryptophan metabolites from dietary tryptophan and the role of these metabolites in neuronal function.

There are about twelve major metabolites of tryptophan that are found in the brain. Two of these metabolites - kynurenine and quinolinic acid - have been shown to be excitatory and, under certain conditions, neurotoxic. Another metabolite kynurenic acid, on the other hand, has been found to be a quinolinic acid antagonist.

Since elevation of brain serotonin levels by dietary tryptophan has been suggested as a potential treatment for many mood disorders, it is essential to evaluate the role of dietary tryptophan in the formation of other tryptophan metabolites. To this end, the study's first goal is to develop a sensitive CG/MS and HPLC method for measurement of all major metabolites in a single sample. Dr. Prasad has just begun such studies. So far we have been able to separate 6 major metabolites in a single run (see Table 2).

	Metabolite	Retention Time (*min*)
1.	Quinolinic Acid	4.81
2.	3-Hydroxy Kynurenine	2.32
3.	Kynurenine	3.23
4.	Tryptophan	6.08
5.	Kynurenic Acid	32.93
6.	Anthranilic Acid	14.63

Table 2. Separation of some major tryptophan - metabolites by High Pressure Liquid Chromatography
Mobile phase: methandol (15%), tetrabutyl ammonium phosphate (2.125mM), sodium phosphate (17mM), sodium acetate (17mM), triethylamine (8.5mM), pH 7.0. Column: Waters-Nova C18 (10CM x 5mm)

Dr. Prasad is continuing these studies to include more metabolites in a single run, and to reduce the retention time. Next he will be determining optimal conditions for extracting these metabolites from tissues.

3. Clinical Research Laboratory, Richard Tulley, Ph.D.

INTRODUCTION AND BACKGROUND

One of the research objectives listed in the US Army grant DAMD 17-88-Z-8023 to the Pennington Biomedical Research Center was to "provide nutrition laboratory research support to the Army's military nutrition research program at USARIEM." To fulfill this objective the Clinical Research Laboratory at Pennington Biomedical Research Center was established in June, 1989 with the employment of Richard T. Tulley, Ph.D., as manager of the laboratory.

PROGRESS

Dr. Tulley has since spent his time in procuring equipment and reagents necessary for establishing the Clinical Research Laboratory. To date, several pieces of major laboratory equipment have been bid on and ordered. These include a floor model refrigerated centrifuge, a bench top centrifuge, an air driven ultracentrifuge (for sample clarification), a fluorescent detector for an existing HPLC, a circulating water bath, and an automated clinical chemistry analyzer (Beckman Synchron CX5). Other pieces of general laboratory equipment which have also been ordered include laboratory refrigerators, an ultralow freezer, a clinical centrifuge, a microscope, analytical balances, an oven, a water bath, automatic pipettors, a stirrer/hot plate, and laboratory supplies and glassware. Other equipment which Dr. Tulley is in the process of evaluating and selecting includes an automated CBC counter with differentials, a gamma counter, an HPLC system for the analysis of catecholamines, an electrophoresis and computerized densitometer, and a PC based laboratory computer system. Other equipment which is currently on site and available to the Clinical Research laboratory includes a Zeeman graphite furnace atomic absorption spectrophotometer (Perkin Elmer Z-5100)

and a diode array UV-Visible Spectrophotometer (Hewlett Packard 8452A). A total of $450,000 of PBRC funds not supplied by U S Army Grant have been dedicated to equipping the Clinical Research Laboratory.

Dr. Tulley has been in contact with CPT Robert J. Moore, Ph.D., Research Biochemist with the US Army Research Institute of Environmental Medicine (USARIEM). The first study to be performed by PBRC Clinical Research Laboratory in conjunction with USARIEM will be a carbohydrate/load bearing study for analysis of approximately 200 samples for glucose, free fatty acids, lactate, B-hydroxybutyrate, ammonia, glycerol, and amino acids. An additional 180 samples will be analyzed for plasma lactate. The study is to take place from August 18 - September 15, 1989. Dr. Tulley has ordered and received reagents for the manual analysis of lactate. B-hydroxybutyrate, and glycerol. Also ordered but not yet received are reagents for glucose, free fatty acids, ammonia, and amino acids. Dr. Tulley is planning to set up the amino acids on a Hewlett Packard 1090 HPLC system and adapt the other tests for automatic analysis by the Beckman Synchron CX5 analyzer. This instrument was shipped on August 11, 1989 from Brea, California and is expected to arrive during the week of August 14-18, 1989.

The next study is expected to take place in late fall of 1989. Analytes to be measured will be glucose, iron, TIBC, ferritin, insulin, and serum and red blood cell folate. The laboratory is expected to be fully operational within the next couple of months and these analytes should not create any difficulty.

Before a method is implemented and used for the analysis of research specimens, it will be thoroughly evaluated for accuracy, precision, linearity, and dependability. At the end of the evaluation period, a protocol for each procedure will be written and mailed to USARIEM for their records.

4. **"Stable Isotope Laboratory" - James DeLany, Ph.D.**

In order to fulfill the research objective of developing Stable Isotope technology for metabolic studies, we have recruited James DeLany, Ph.D. Dr. DeLany will arrive at PBRC in September, 1989 and will establish this technology.

5. "U. S. Army Menu Modification Project" - Nena Cross, Ph.D.

INTRODUCTION AND BACKGROUND

Since 1985, nutrition initiatives have been introduced into the Armed Forces Recipe Service, the Army Master menu and the Army Food Service Program to provide soldiers with diets lower in sodium, fat, and cholesterol. The Military Nutrition Division of United States Army Research Institute of Environmental Medicine (USARIEM) has conducted assessments of soldiers' nutrient intakes in four garrison dining facilities. An evaluation of nutrient intakes in 1986 of soldier's at the NCO Academy Dining Facility at Ft. Riley, Kansas and the 80th Ordnance Dining Facility at Ft. Lewis, Washington was conducted (1,2). In 1988 nutrition assessments were conducted at the 39th Engineer Battalion - 10th Special Forces Group Dining Facility at Ft. Deven, Massachusetts (3,4). A dietary assessment and cardiac risk appraisal of Army basic trainees was conducted at Ft. Jackson, South Carolina in August, 1988 (5,6). Data from these garrison dining facility studies indicated that the nutrient intakes of male soldiers eating in these dining facilities were similar and met the Military Recommended Dietary Allowances for energy, protein vitamins, and minerals. Fat intakes of participants at Ft. Riley, Ft. Lewis, and Ft. Devens exceeded the target level of 35% fat/total calories. In all dining facilities studied, the average daily cholesterol intakes of male subjects were two to two-and-a-half times the levels recommended by the American Heart Association and the National Cholesterol Education Program (<300 mg/dl). Average sodium intakes at Ft. Riley and Ft. Devens were above the guidelines of 1400-1700 mg/1000 kcal (12,13,14,15).

Eight recommendations were offered based on these results. The recommendations are listed below:

1. Continue revision of the Army Forces Recipe File to reduce sodium in the recipes. Herbs and spices could be substituted in place of high sodium seasonings to insure palatability of the foods prepared.
2. Continue to decrease the percentage of calories obtained from fat to 35% or less of total calories.
3. Provide soldiers low cholesterol, low fat alternatives to eggs, and evaluate the acceptability and impact of using this approach to moderate soldiers' cholesterol intakes.

The Menu Modification Project will include modification of two weeks of Army garrison menus to meet the nutrition targets specified by the Army. The purpose of the menu modification project is to provide healthful, nutritious menu selections which moderate soldiers' sodium, fat, and cholesterol intakes.

The specific objectives of the menu modification project are to:

1. Reduce the sodium content of the menus to meet the Army target of 1400-1700 mg sodium/1000 kilocalories.
2. Decrease the fat content of the meals to 35% (maximum) of total calories.
3. Reduce the cholesterol content to 100 mg/1000 calories, not to exceed 300 mg/day.

Progress

The Army Menu Modification Project is scheduled to begin in January, 1990. Completion is anticipated by May, 1991. Approval of the human consent form to be used in the study is pending as is final, formal Army approval. Coordination of the project procedures with those most beneficial to the Army has been accomplished.

The design of the study includes these 5 phases:

Phase I: Nutrient Analysis

The Extended Table of Nutrient Values will be used to analyze the nutrient content of the recipes currently in use. This data base is available through the Louisiana State University (LSU) Cardiovascular Health Research Center. After modification, the recipes will be analyzed for compliance with objectives.

Phase II: Menu Modification

The menus will be modified to meet the Military Recommended Daily Allowance (MRDA) and Army targets for reduced sodium, cholesterol, and fat. After modification, the revised menus will be reviewed by a panel of experts for nutritional content, visual appeal, appropriateness to target population, and preparation feasibility.

Phase III: Sensory Evaluation

The modified recipes will be tested in the Food Preparation Kitchen of the LSU Human Ecology Building. The completed products will be evaluated by 6-8 trained volunteer sensory panel members.

Phase IV: Acceptance Testing

After sensory panel scores have indicated that a satisfactory product has been produced, each modified menu items will be tested on a larger scale.

Phase V: Analysis

The completed modified recipes will be analyzed for achievement of targeted objectives. The acceptability scores for each modified menu item will be calculated.

The completed menu cycle will be tested for acceptability by Army personnel in the Ft. Polk garrison dining facility.

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A P P E N D I X

FORT POLK HEART SMART PROJECT

PILOT STUDY

June 1989

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FORT POLK HEART SMART PROJECT

Eating Habits Questionnaire (Part I)

Pilot Study - June 1989 (n=7)

Question	n (%)
Which describes your eating habits best?	
I eat one meal a day	1 (14)
I eat two meals a day	5 (71)
I eat three meals a day	1 (14)
I am trying to lose weight?	
Yes	7 (100)
If you are trying to lose weight, you would like to lose...	
5-10 pounds	1 (14)
10-15 pounds	1 (14)
20-25 pounds	1 (14)
25-30 pounds	2 (29)
> 30 pounds	2 (29)
I spent on groceries last month...	
<$100.00	2 (29)
$100.00 - $150.00	2 (29)
$150.00 - $200.00	1 (14)
$200.00 - $250.00	2 (29)

FORT POLK HEART SMART PROJECT

Demographic Data

Pilot Study - June 1989 (n=7)

Question	n (%)
Last year of school completed?	
High School	5 (71)
College Degree	1 (14)
Technical School	1 (14)
Are you receiving food stamps?	
No	7 (100)
Are you receiving WIC vouchers?	
Yes	1 (14)
No	6 (86)

FORT POLK HEART SMART PROJECT

Opinion Survey

Question	n (%)
I have often had to take orders from someone who did not know as much as I did.	
True	4 (57)
I don't blame anyone for trying to grab everything he can get in this world.	
True	5 (71)

FORT POLK HEART SMART PROJECT

Leisure Time Physical Activity

Pilot Study - June 1989 (n=7)

Question	n (%)
In the past month did you...	
jog or run?	
no	7 (100)
ride a bicycle or an exercise bike?	
no	7 (100)
do aerobics or aerobic dancing	
no	5 (71)
do other dancing?	
no	6 (86)

Cigarette Smoking History

I smoke at least one cigarette a week	3 (43)
I have never smoked a cigarette	3 (43)
I have tried cigarettes	1 (14)
Age began smoking...	
15 years	2
13 years	1
Number of years smoking...	
6 years	2
10 years	1

FORT POLK HEART SMART PROJECT

Eating Habits Questionnaire (Part II)

How often do you eat the following items?
(Only foods reported are listed)

At Least Once or More a Day	Never
hot dogs, ham, lunch meats	mixed dished w/chicken
milk*	beef stew, pot pie
butter*	veal, lamb*
bacon	margarine*
sausage	cream, half and half*
cheese*	fish*
eggs	soups
margarine*	nondairy creamer*
mayonnaise	doughnuts
cold cereal	cookies
	chocolate candy*
	pies
	breads, rolls, crackers
	venison, liver*
	butter
	cooking fat, lard, Crisco*
	pancakes, waffles
	gravy, meat sauces
	cold cereals
	cornbread, grits, tortillas*

*Reported by most of the subjects

FORT POLK HEART SMART PROJECT

Eating Habits Questionnaire (Part II)

Pilot Study - June 1989 (n=7)

Question	n (%)
Where does your family usually purchase most of its groceries?	
commissary	6 (86)
discount food mart	5 (71)
supermarket	2 (29)
shopette	1 (14)
small specialty stores	1 (14)
On the average, someone in my family shops for groceries...	
2-3 times per month	3 (43)
1 time per month	1 (14)
1 time per week	1 (14)
2-3 times per week	1 (14)
4 times per week	1 (14)
My food habits change when my spouse is gone...	
Yes, I prepare more packaged or quick foods	6 (86)
No, I eat the same way	1 (14)

FORT POLK HEART SMART PROJECT

Eating Habits Questionnaire (Part II)

Question	n (%)
Which ways do you prepare each of the following meats?	
3 of 9 meats were fried	2 (29)
4 of 9 meats were fried	2 (29)
5 of 9 meats were fried	2 (29)
6 of 9 meats were fried	1 (14)